

In re: Philip Stephen Goodall et al.  
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## **Remarks**

### **I. Drawings**

The Action objects to the drawings because they do not include reference signs mentioned in the description. A proposed change to the drawings is enclosed. Formal drawings will follow under separate cover after the Examiner has approved of the proposed changes.

### **II. Specification**

The title has been amended and an abstract of the disclosure has been added as requested in the Action.

The Action further objects to the Specification because there is no heading for the summary of the invention. Applicants submit that a section for a summary of the invention is suggested by the M.P.E.P. but not required. In particular, the M.P.E.P lists a suggested layout for the specification, which includes a summary of the invention, but does not state that the layout is required ("The following guidelines illustrate the preferred layout and content for patent applications. These guidelines are suggested for the applicant's use." M.P.E.P § 601.01 (emphasis added). In addition, 37 C.F.R. § 1.73 provides, in part: "Such summary should, when set forth, precede the detailed description." (emphasis added). The phrase "when set forth" implies that the summary is not always present and further supports Applicants position that a summary of the invention is not required. In fact, it appears to be a long-standing practice of the U.S.P.T.O. to issue patents without requiring a summary of the invention. The following patents are provided as examples of patents issued that do not include a summary of the invention: U.S. Patent Nos. 6,535,976; 6,535,233; 6,489,663; and 4,181,801. Accordingly, Applicants respectfully request that the objection be withdrawn.

### **III. Claims**

#### **A. Status of the Claims**

Claims 1-34 are pending. Claims 19 and 33 stand rejected under 35 U.S.C. § 112.

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Claims 1 and 28-30 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,313,067 to Houk et al. ("Houk") in further view of Kellner et al. (Analytical Chemistry, pp. 927-828 (1998) ("Kellner")). Claims 2-5 and 13-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner and in further view of G.B. Patent No. 2288273 to Hu ("Hu"). Claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner and Hu and in further view of G.B. Patent No. 2273200 A to Dowell ("Dowell"). Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner, Hu, and Dowell and in further view of G.B. Patent No. 2219432 to Stuke ("Stuke"). Claims 8-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner, Hu, Dowell, and Stuke and in further view of U.S. Patent No. 5,679,950 to Baba et al. ("Baba"). Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner, Dowell, Stuke, Baba, and in further view of U.S. Patent No. 5,640,010 to Twerenhold ("Twerenhold"). Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner, Hu, Dowell, Stuke, Baba, Twerenhold, and in further view of U.S. Patent No. 6,184,982 to Karanassios ("Karanassios"). Claims 15-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner and in further view of U.S. Patent No. 6,028,308 to Hager ("Hager"). Claims 18-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner in view of G.B. Patent No. 2267994 to Holmes ("Holmes") in further view of Hager. Claim 21 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner, Hu, Dowell, Stuke, and in further view of U.S. Patent no. 5,872,629 to Colvard ("Colvard"). Claims 22-27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner and Dowell and in further view of Hu. Claim 31 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner and in further view of U.S. Patent No. 4,734,579 to Lucatorto ("Lucatorto"). Claim 32 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner, Lucatorto, and in further view of U.S. Patent No. 5,872,629 to Colvard ("Colvard"). Claims 34 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Houk in view of Kellner and in further view of Dowell.

**B. The § 112 Rejection**

Claim 19 has been amended to provide antecedent basis for "optical detector." The amendment to Claim 19 is made for purposes of clarification and not to address issues regarding the prior art.

The Action takes the position that the term "hyperfine splitting" in Claim 33 is not described in the specification and that "[t]he specification does not teach on the claimed hyperfine splitting or the method of achieving the splitting." See the Action, page 3, paragraph 1. Applicants submit that hyperfine splitting is a phenomenon that occurs naturally, and of which the analyst is able to take advantage in order to glean further information. The specification has been amended on page 5, line 3 to state that "[s]electivity may also be enhanced by optical probing of hyperfine splitting." Support for the amendment is found in Claim 33 as originally filed.

Applicants submit that Claims 19 and 33 meet the requirements of § 112, and request that the rejection under § 112 be withdrawn.

**C. The § 103(a) Rejection**

**Brief Summary of the Invention**

As recited in Claim 1, the present invention is directed to "an Inductively Coupled Plasma Source Mass Spectrometer equipped with a multi-dimensional detector system wherein ions transmitted by the mass spectrometer are detected with high selectivity" and, as recited in Claim 28, "a method for detecting and quantifying low concentrations of stable and/or radioisotopes and/or low abundance isotopes which comprises analyzing a sample in an instrument according to Claim 1." According to embodiments of the invention, a multi-dimensional instrument may be provided such that individual, but complementary, measurement technologies can be integrated into a whole that may be considerably more than the sum of its parts.

Accordingly, lower limits of detection may be achieved which are outside the range of other mass analyzers. Applicants submit that many of the references cited in the Action are concerned with high sensitivity, as opposed to selectivity. The present invention may be highly selective in that it can reduce the extent of background signals, thereby allowing for

lower limits of detection. Simply providing an instrument with high sensitivity would not necessarily facilitate achievement of selectivity.

Applicants submit that none of the cited references teach or suggest an inductively coupled plasma source mass spectrometer equipped with a multi-dimensional detector system wherein ions transmitted by the mass spectrometer are detected with high selectivity as recited in Claim 1.

In order to establish a *prima facie* case of obviousness under § 103, the prior art reference or references must teach or suggest all the claim limitations. There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. There must also be a reasonable expectation of success. *See* M.P.E.P. § 2143. As affirmed by the Court of Appeals for the Federal Circuit, to support combining references in a § 103 rejection, evidence of a suggestion, teaching, or motivation to combine must be *clear and particular*, and this requirement is not met by merely offering broad, conclusory statements about teachings of references. *In re Dembiczak*, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). No evidence of a suggestion or motivation to combine the reference teachings has been presented with respect to the claims as amended. Therefore, the evidence does not establish a *prima facie* case of obviousness under § 103, and it is respectfully submitted that this rejection should be withdrawn.

**Claims 1 and 28 are patentable over Houk and Kellner**

Claims 1 and 28 stand rejected under § 103(a) as being unpatentable over Houk in view of Kellner.

Houk proposes an inductively coupled plasma source mass spectrometer. The inductively coupled plasma source mass spectrometer discussed in Houk appears to be standard commercial equipment. Houk discusses using the inductively coupled plasma source mass spectrometer in connection with a separation technique rather than for analytical purposes.

The Action concedes that Houk does not teach a multi-dimensional detector system. See the Action, page 4, first paragraph. The Action states that it would have been obvious to

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combine Houk with Kellner, which, according to the Action, "teaches that the multi-dimensional approach to analyzing samples is already well established." See *Id.*

Kellner proposes that multi-dimensional approaches are well established in many types of chromatography, but makes no reference or suggestion that such techniques could be used with respect to an inductively coupled plasma source mass spectrometer. In fact, Kellner recites an extensive list of techniques that can be used with multi-dimensional approaches, yet makes no mention of an inductively coupled plasma source mass spectrometer.

Applicant does not dispute that certain of the claimed features are known in the art. It is simply not proper to combine elements of separate prior patents when there is no suggestion to combine in any of those patents. *Panduit Corporation v. Dennison Manufacturing Co.*, 810 F.2d 1561, 1568 (Fed. Cir. 1987). For example, the Federal Circuit has noted that, "[i]t is insufficient to establish obviousness that the separate elements of the invention existed in the prior art, absent some teaching or suggestion, in the prior art to combine the elements." *Arkie Lures Inc. v. Gene Larew Tackle, Inc.*, 43 USPQ2d 1294, 1297 (Fed. Cir. 1997) (emphasis added). Further, the mere fact that the known principles are employed cannot render the invention obvious; most inventions employ known principles. *Lindemann Maschinenfabrik v. American Hoist & Derrick Co.*, 221 USPQ 481, 489 (Fed. Cir. 1984). Applicants reiterate that it is the recited combination of elements which is patentable, and it is the claimed combination of features that forms the proper basis for review. One of skill in the art would not have combined the references cited above.

In view of the foregoing, Applicants respectfully submit that the invention of Claim 1 is not taught or suggested by Houk or Kellner and request that the rejection of Claim 1 and Claims 2-27 depending therefrom and Claim 28 and Claims 29-34 depending therefrom be withdrawn. At least certain of these dependent claims are further patentably distinguishable from the cited art for the reasons set forth below.

**Claim 2 is independently patentable**

Claim 2 stands rejected as being unpatentable over Houk in view of Kellner and Hu. Claim 2 depends from Claim 1 and further recites "wherein the multi-dimensional detector

system comprises a plurality of sub-systems which provide a unitary response." The Action concedes that Houk and Kellner do not teach a plurality of sub-systems.

Hu proposes two separately distinct systems that are bolted together, but operate independently of each other and between which there appears to be no interaction. Hu discusses a mass spectrometer 54 and an induction coupled plasma apparatus 28. A gate valve 72 is open when the analysis system is operating in mass spectrometer mode and is closed when the system is operating only in optical measuring mode. See Figure 1. Accordingly, Hu does not teach or suggest a plurality of sub-systems which provide a unitary response as recited in Claim 2. Accordingly, Applicants request that the rejection of Claim 2 be withdrawn.

**Claim 7 is independently patentable**

Claim 7 stands rejected under § 103(a) as being unpatentable Houk in view of Kellner, Hu, Dowell, and Stuke. Claim 7 recites "wherein the specific detector is based on optical spectroscopy." The Action concedes that Houk, Kellner, Hu and Dowell do not teach detection based on optical spectrometry and relies on Stuke.

The present invention uses optical spectroscopy to detect ions. In contrast, Stuke discusses a system in which the primary ionization is achieved through multiphoton ionization induced by a pulsed laser, and an optical detector monitors emissions from the resultant ions in the ion source. See Stuke, page 6, lines 15-20 ("[T]he ions produced in the focus region 34 are used for analysing the substances which are present in the ionization space, but also used is the optical radiation (especially fluorescence radiation) emitted by the respective substances within the ionization space." (emphasis added)) Moreover, the system discussed in Stuke has two independent sources, which are not coupled to provide a unitary response.

Accordingly, Applicants submit that Stuke does not teach or suggest detecting ions based on optical spectroscopy and request that the rejection of Claim 7 be withdrawn.

**Claims 8 is independently patentable**

Claim 8 stands rejected under § 103(a) as being unpatentable over a combination of Houk, Kellner, Hu, Dowell and Baba.

Claim 8 recites "wherein the specific detection of the transmitted ions is *via* resonance scattering processes." The Action concedes that Houk, Kellner, Hu, and Dowell do not teach detection via resonance scattering processes, and relies on Baba.

Baba proposes a trapping device. The detecting apparatus appears to rely on the measurement of resonance scattering light from probe ions. See Baba, Abstract ("An ion trapping mass spectrometer permitting highly sensitive mass spectrometry through in-situ observations.")(emphasis added). The system in Baba examines the interaction of ions of interest with probe ions. In contrast, the claimed invention is directed to an inductively coupled plasma source mass spectrometer, which transmits ions. Therefore, it would not be obvious to combine references such as Houk and Hu, which propose an inductively coupled plasma source mass spectrometer, with a trapping device as proposed by Baba. Accordingly, Applicants request that the rejection of Claim 8 be withdrawn.

**Claim 11 is independently patentable**

Claim 11 stands rejected under § 103(a) as being unpatentable over a combination of Houk, Kellner, Hu, Dowell, Stuke, and Twerenhold. Claim 11 recites "means for the detection of the resonantly scattered photons with high temporal and spatial resolution." The Action concedes that Houk, Kellner, Hu, Dowell and Stuke do not teach temporal and spatial resolution and relies on Twerenhold.

Twerenhold proposes a mass spectrometer with a phonon (as opposed to photon) sensitive cryogenic particle detector, which can determine the masses of "macromolecules, proteins, large, peptides, long DNA-fragments, and polymers." See Twerenhold, Abstract. Phonons are vibrational movements observed in crystals when they undergo an impact. The techniques discussed in Twerenhold rely on laser ionization and the use of a single detector.

In contrast, Claim 1 recites that an inductively coupled plasma source mass spectrometer is equipped with "a multi-dimensional detector system wherein ions transmitted by the mass spectrometer are detected with high selectivity." There is simply no

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apparent motivation to combine references that pertain to ion detection (i.e., Stuke, Houk, and Hu) with Twerenhold, which determines the masses of macromolecules and the like to arrive at the claimed invention. Accordingly, Applicants request that the rejection of Claim 11 be withdrawn.

**Claim 21 is independently patentable**

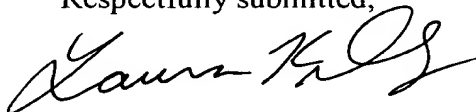
Claim 21 stands rejected under § 103(a) as being unpatentable over a combination of Houk, Kellner, Hu, Dowell, Stuke, and Colvard. Claim 21 recites "wherein the ion beam is accelerated to induce an optical isotope shift by Doppler shifting." The Action concedes that Houk, Kellner, Hu, Dowell, and Stuke do not teach the use of Doppler shifting and relies on Colvard.

Colvard proposes a device for measuring changes in the relative height or depth of microscopic surface features of a sample. Specifically, Colvard discusses that crater depth measurements may be made using a dual beam optical interferometer. (See Colvard, col. 4, lines 8-19). The Action provides no motivation to combine Colvard with the cited references to arrive at the claimed invention. Applicants submit that Colvard is simply unrelated to ion detection systems, and as such, it would not have been obvious to combine Colvard with Houk, Kellner, Hu, Dowell, and Stuke. Applicants request that the rejection of Claim 21 be withdrawn.

**III. Conclusion**

Applicants respectfully submit that, for the reasons discussed above, the present case is in form for allowance. Accordingly, Applicants request allowance of all the pending claims and passage of this application to issue.

Respectfully submitted,



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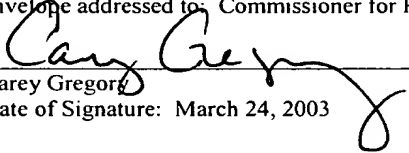


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Date of Signature: March 24, 2003

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**Version with Markings to Show Changes Made to the Specification**

The following is an addendum to the concurrently filed Amendment in response to the Official Action dated October 23, 2002 in the above-referenced application. This addendum includes a marked-up version of the change made to the specification by the present Amendment.

**In the claims:**

Claim 19 has been amended as follows:

19. (Amended) An instrument according to claim 1, provided with means for manipulating the ion beam energies to bring the transmitted ion beam into resonance within the detection volume of [the]an optical detector.

## ABSTRACT

An inductively coupled plasma source mass spectrometer is equipped with a multidimensional detector system wherein ions transmitted by the mass spectrometer are detected.